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ISOETES TEXANA (ISOETACEAE): A NEW SPECIES FROM THE TEXAS COASTAL BEND

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ABSTRACT

Isoetes texana Singhurst, Rushing, & Holmes, sp. nov., endemic to Calhoun and Aransas counties of the Texas Coastal Bend, is described. The new species is characterized by its aquatic habitat, leaf length of up to 62 cm, and smooth megaspore surfaces. Photos of the plant and habitat and SEM photos of the megaspores are included.
KEY WORDS: *Isoetes*, Isoetaceae, Texas, USA

Recent field study in the Texas Coastal Bend has resulted in the discovery of a previously unknown aquatic species of *Isoetes* (Isoetaceae), which is described here as new. *Isoetes texana* is the second species of the genus endemic to Texas, the other being *I. lithophila* N. Pfeiffer.

Isoetes texana Singhurst, A.E. Rushing, & W.C. Holmes, sp. nov. Figs. 1 (a and b), 2, 3, and 4.

Isoetes flaccidae A. Braun *similis sed differt paginis laevibus megasporangiorum* (*vs. paginis tuberculatis vel rugulosis*).

TYPE: USA. TEXAS. Calhoun Co.: Falcon Point Ranch, about 5 mi ENE of Seadrift, depressional pond with sandy base in Ingleside Sandhills, 10 Jun 2010, *Jason R. Singhurst 18336* (holotype: BAYLU; isotypes: BRIT, TEX).

Plants aquatic, emergent. **Rootstocks** globose, 2 lobed, 3–9 mm wide. **Leaves** evergreen, green-yellow, 24–62 cm long, pliant, gradually thinning from base to the pointed apex; velum covering whole sporangium. **Sporangium wall** unpigmented. **Megaspores** white, 350-405 µm, smooth to obscurely rugulose, girdle smooth. **Microspores** white in mass, 25–30 µm, surfaces papillose.

Representative specimens. **USA**. **TEXAS**. Aransas Co.: Aransas National Wildlife Refuge, Ingelside Sand freshwater depressional pond, 21 Oct 2010, *Singhurst 18338* (BAYLU); Calhoun Co.: Falcon Point Ranch, 0.2 mi S of jct. of Harned Road and Tex. Hwy 185, 2.8 mi E of Seadrift, Pond 1; Ingleside Sand freshwater depressional pond, 20 Oct 2010, *Singhurst, Hanks, and Hensen 18339* (BAYLU), *18340* (BAYLU), *18341* (BAYLU), *18342* (BAYLU), and *18343* (BAYLU).

Etymology. The species is named after the state of Texas. As a common name, we suggest Tejas quillwort to further honor the state. Before becoming an independent country and then a state of the USA, Texas was known as Tejas. "The word *texas* (*tejas*, *tayshas*, *texias*, *thecas*?, *techan*, *teysas*, *techas*?) had wide usage among the Indians of East Texas even before the coming of the Spanish, whose various transcriptions and interpretations gave rise to many theories about the meaning. The usual meaning was 'friends.' ... How and when the name Texas first reached the Spanish is uncertain" (Handbook of Texas Online 2011).

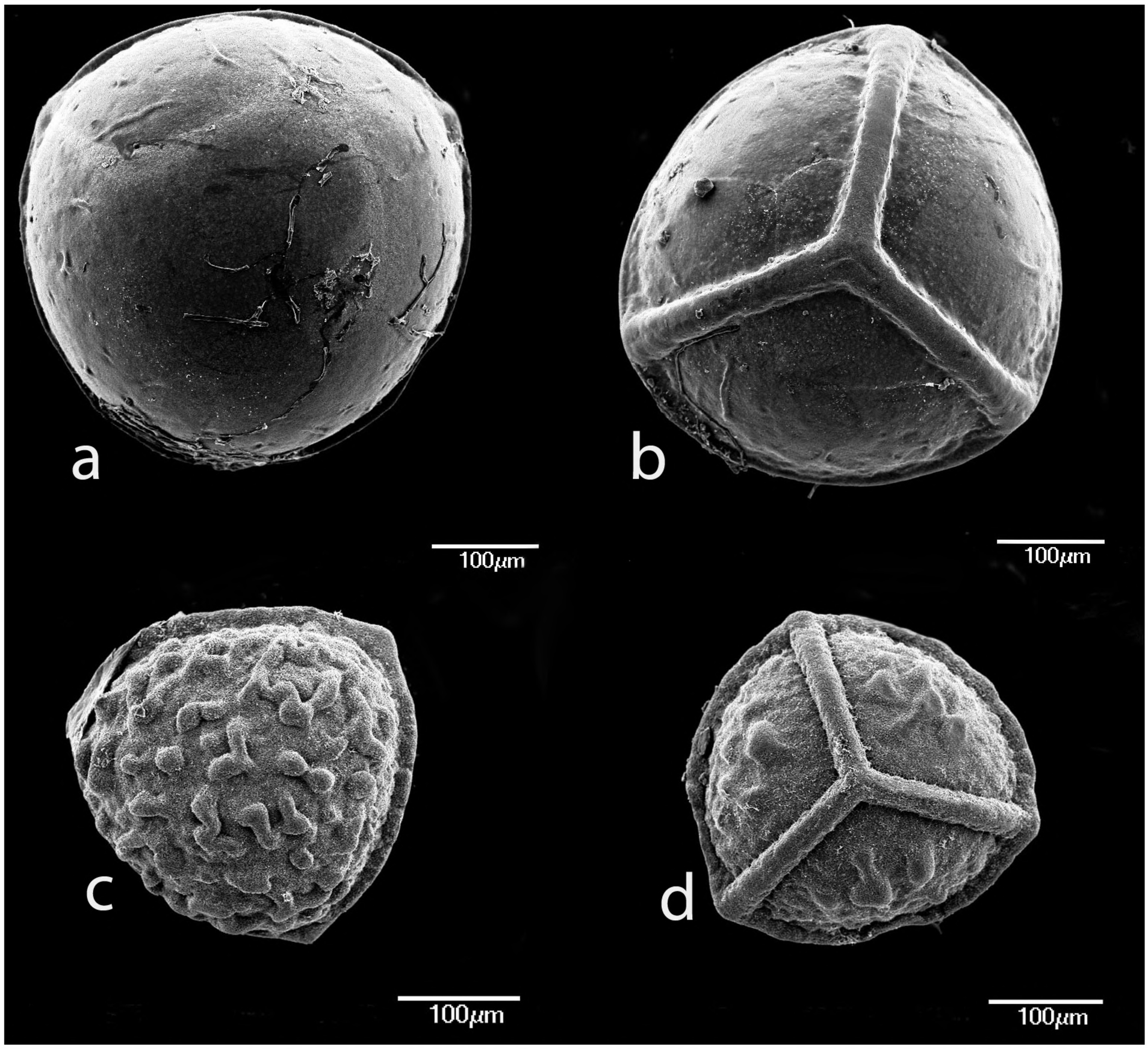

Figure 1. Megaspores of *Isoetes texana* and *I. flaccida*: (a, b) *I. texana*, *Singhurst 18336 (* holotype, BAYLU) — a. distal view, b. proximal view; (c, d) *I. flaccida*, *A.A.Eaton 337* (LL) — a. distal view, b. proximal view.

Figure 2. *Isoetes texana* (*Singhurst 18336*, holotype, BAYLU) immediately after collection. The pen is 18 cm long.

Figure 3. *Isoetes texana* at the type locality — the leaves are lying flat on water surface. Erect plants are *Eleocharis montevidensis*.

Isoetes texana is characterized by its aquatic habitat, long leaf length, megaspores of 350–405 µm with smooth surfaces (which may occasionally be obscurely rugulose), white color of microspore mass, and yellow-green leaf color (5GY 4/2-4, Munsell Color, undated).

The new species resembles *Isoetes flaccida* A. Braun of Florida and Georgia and keys near its vicinity in both Lellinger (1985) and Taylor et al. (1993). The resemblance is mainly expressed in length of the leaves and aquatic habitat. *Isoetes flaccida* differs from *I. texana* by the variable size of megaspores (250-500 µm) with tuberculate to prominently rugulate surfaces, see Fig. 1 (c and d), light brown color of the microspore mass, and bright green color of the leaves. The two species are allopatric, separated by about 1200 km at the nearest point of their ranges.

Isoetes texana is easily distinguished from the other four species reported from Texas (Holmes et. al. 2005) by size and by habitat, being the only aquatic species in the state. *Isoetes lithophila* N. Pfeiffer and *I. piedmontana* (N. Pfeiffer) C.F. Reed are limited in distribution to seasonally saturated soils of granitic mountains of the Edwards Plateau vegetational region of the state and the leaves are much shorter, generally less than 15 cm. *Isoetes butleri* Englemann occurs in the same granitic mountains but is also known from glades of the Weches Formation in San Augustine and Sabine counties of east Texas. It also is generally less than 15 cm high. The other species, *I. melanopoda* Gay & Durieu, is widely distributed in the south-central USA and scattered disjunct stations further east (Taylor et al. 1993). In Texas, *I. melanopoda* occurs in seasonally wet soils in the eastern half of the state north of 29.5° latitude. This species is said to reach a height of 40 cm but is normally less than 25 cm in Texas. It may also be recognized by the pale to lustrous black color near the base of the plant and rugulate to tuberculate or reticulate megaspore surfaces.

Presently, *Isoetes texana* is known only from Aransas and Calhoun counties. It is limited to freshwater ponds and interdunal swales in neutral to moderately alkaline sands of Pleistocene and to Holocene barrier islands in the Gulf Coastal Bend of southern Texas. The vegetation is dominated by *Rhynchospora* spp., *Fuirena* spp., *Eleocharis* spp., and *Cyperus* spp. The dominant species include *Fuirena scirpoidea, Fuirena longa, Rhynchospora microcarpa*, and *Rhynchospora divergens*. Other characteristic and common species include *Rhynchospora nitens, Cyperus oxylepis, Cyperus polystachyos var. texensis, Eleocharis geniculata* (= *Eleocharis caribaea*), *Eleocharis flavescens, Eleocharis montevidensis, Eleocharis parvula, Xyris jupicai, Agalinis fasciculata, Bacopa monnieri, Buchnera americana* (= *Buchnera floridana*), *Oldenlandia uniflora* (= *Hedyotis uniflora var. fasciculata*), *Spiranthes vernalis, Drosera brevifolia*, and *Utricularia subulata*. This plant community association occupies sandy depressions of variable hydrology. Some ponds draw down and desiccate in drier periods, but *Isoetes texana* seems restricted to those that hold water throughout the year (based upon limited observations). Structure varies with depth of water (or depth to water table) and frequency of inundation, and composition ranges from a sparse cover of tufted annuals to complete coverage by rhizomatous perennials.

Figure 4. Freshwater depressional pond at the type locality on the Falcon Point Ranch in Calhoun County.

Isoetes texana is known from two locations (occurrences) and is considered globally rare with a ranking of G1S1. Immediate threats to this species include development and expansion of ponds for livestock use and human recreation (fishing). The population in Aransas National Wildlife Refuge in Aransas County is well protected. The Calhoun County occurrences are on private land and appear to

be reasonably secure at this time. Rising sea level may present a long-term threat to the species as they appear susceptible to salt water intrusion.

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